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Post-Visit Reinforcement of Zoo Conservation Messages: The Design and Testing of an Action Resource Website

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Abstract

Wildlife tourism attractions such as zoos are uniquely placed to make an impact on people's everyday environmentally responsible behaviors. However, research suggests that visitors who leave such sites with a heightened awareness and good intentions rarely translate their intentions into post-visit environmental actions. This paper reports on the development of a website-based action resource designed to reinforce, complement, and extend zoos' on-site conservation messages and support visitors' translation of environmental behavioral intentions into actions. The effectiveness of the website in encouraging post-visit engagement in environmental behavior was tested using an experimental design with a follow-up sample of 475 zoo visitors across four sites in three countries. The group that had accessed the website scored significantly higher on a Behavior Change index than the group that had not accessed the website. Website features identified as most effective in engaging visitors and maximizing their uptake of environmentally sustainable behavior are discussed.

Keywords: zoos and aquariums, post-visit, action resources, learning for sustainability, conservation education

It is widely accepted that current world-wide economic development trends are not sustainable in the long term and that societies need to be educated and encouraged to develop and adopt more sustainable practices in work, home, and leisure environments. Human activities are a major cause of global environmental degradation—solutions must be found to arrest and reverse this trend not only at governmental and institutional levels, but also through altering the everyday practices of millions of people world-wide. For that, a social science perspective is needed; a perspective that investigates the prevailing human-environment mindset and searches for ways to encourage and support people to make environmentally sensitive lifestyle choices. Wildlife-based tourism attractions such as zoos and aquariums are well-placed to respond to this challenge. Accordingly, a new focus of research is emerging that explores and attempts to improve the impact of wildlife-based tourism attractions on visitors' immediate and long-term adoption of environmentally sustainable behavior.

Zoos, Conservation Education, and Visitors' Environmental Learning

It is estimated that by 2030, 70% of the world's population will be living in cities and that as a consequence attractions such as zoos and aquariums will be at the forefront of offering nature-based visitor experiences and education about the importance of biodiversity (Frost, 2011; Grajal, 2013; WAZA, 2015). According to the World Association of Zoos and Aquariums (www.waza.org) approximately 700 million people worldwide visit zoos and

aquariums each year. Clearly, zoos are well-placed to reach large numbers of visitors with wildlife conservation messages.

The few studies that have investigated the impact of zoos and aquariums on visitors' subsequent environmental behavior suggest that giving visitors a first-hand experience of wildlife has a strong emotional impact and is a powerful way of delivering pro-conservation messages (Adelman, Falk, & James, 2000; Ballantyne, Packer, & Falk, 2011). Engagement with animals can thus be used as a hook to help focus individuals' attention on the plight of wildlife and the role of humans in ensuring their long-term survival. A zoo visit provides an important opportunity for visitors to strengthen their feelings of connectedness with nature (Bruni, Fraser, & Schultz, 2008; Falk, Reinhard, Vernon, Bronnenkant, Heimlich, & Deans, 2007). Such feelings, together with an openness to learning and discovery (Packer, 2006), mean that most zoo visitors are receptive to reflecting on their personal commitment and actions in relation to the environment. Accordingly, zoos are well-positioned to educate visitors regarding the consequences of human activities on animals and the environment, to facilitate personal reflection on environmental actions, and to encourage the adoption of environmentally sustainable behaviors.

Although zoos have viewed conservation education as important for many years, it is only recently that they have come to the understanding that they also "need to empower our visitors to make those lifestyle changes" (Penning, 2011, p. 1). Today, most zoos stress the importance of both conservation and education in their mission statements (Patrick, Matthews, Ayers, & Tunnicliffe, 2007) although only a few have been able to effectively demonstrate their positive impact on visitors' adoption of environmental/conservation actions (Adelman et al., 2000; Ballantyne & Packer, 2011, 2016; Balmford et al., 2007; Dierking, Burtnyk, Buchner, & Falk, 2002; Dierking, Adelman, Odgen, Lehnhardt, Miller, & Mellen, 2004; Luebke & Grajal, 2011; Smith, Broad, & Weiler, 2008). To date, the wildlife conservation actions that attractions such as zoos have encouraged their visitors to take have mostly been limited to on-site, one-off, or infrequent behaviors, such as making donations, signing petitions, or avoiding purchasing particular products. Changes in such behaviors are laudable but do not in general yield the same potential impact for the environment as changes to long-term routine behaviors at work or in the home.

Ongoing research by Ballantyne, Packer, and colleagues (Ballantyne & Packer, 2011; Ballantyne, Packer, & Falk, 2011; Ballantyne, Packer, & Hughes, 2009; Ballantyne, Packer, & Sutherland, 2011; Hughes, Packer, & Ballantyne, 2011) has identified factors affecting visitors' on-site conservation learning (including knowledge, attitudes and behavior). Together with other studies, their work has shown that although visitors commonly leave zoos with a heightened awareness of environmental issues and positive environmental behavioral intentions, few translate their intentions into environmental actions (Ballantyne et al., 2011; Smith et al., 2008). Smith and colleagues (Smith et al., 2008; Smith, Curtis, & van Dijk, 2010) suggest several reasons for shortcomings in the impact of zoo experiences on visitors' post-visit environmental behavior change. They argue that most visits are too short in duration to influence the uptake of pro-environmental behavior and that on-site communication regarding environmental behavior needs to be more strategically designed and targeted. According to Ballantyne and Packer (2011), it takes time for zoo visitors to process their experience both cognitively and affectively, develop new concepts and ideas, and actively put these into practice in their everyday lives. Clearly, zoo visitors need to be supported and encouraged to engage in the conservation learning process both during and after their visit if lasting and effective behavior change is to occur and their environmental behavioral intentions are to translate into real actions (Ballantyne & Packer, 2011; Smith et al., 2008).

The importance of on-going consolidation and reinforcement of learning has been argued in both formal education (Anderson, Lucas, Ginns, & Dierking, 2000) and free-choice learning contexts (Ballantyne & Packer, 2011; Falk & Dierking, 2000). The need for on-going strategies to prompt and remind people about desired behaviors at the time the behavior is required is also an important tenet of Community-Based Social Marketing Theory (McKenzie-Mohr & Smith, 1999). Post-visit support for visitor learning, however, is rarely provided in the context of free-choice learning experiences. As Falk and Dierking (2000) argue in the context of museums, free-choice learning is more effective when the knowledge and experiences gained during the visit are augmented by subsequent events and experiences. We would similarly argue that the heightened visitor awareness of conservation issues engendered by a zoo visit quickly dissipates unless supported and reinforced by subsequent learning experiences. This raises the questions: What can be done off-site to support and reinforce zoo visitors' on-site conservation learning and how can zoos encourage and assist their visitors to translate their intentions into environmentally sustainable behaviors?

Post-Visit Action Resources

Ballantyne and Packer (2011) argue that providing post-visit action resources to support and reinforce zoo onsite learning experiences is one way to increase the percentage of visitors who adopt conservation behaviors in their everyday lives. They use the term *action resources* to refer to visitor learning experiences that build on and extend on-site conservation messages. Action resources motivate visitors to translate intentions into actions through reminders, prompts, or social incentives and "should be explicitly behavior-orientated in their content—providing specific examples or models of appropriate behavior—rather than providing additional information or just repeating on-site messages" (Ballantyne & Packer, 2011, p. 210). They should also include "examples of appropriate responses that visitors might make to fulfil their behavioral intentions" (p. 210). To be successful, a variety of action responses catering for different levels and interests of commitment should be provided. While a zoo on-site experience raises visitors' awareness of environmental issues, targeted post-visit action resources should encourage further reflection on the experience and encourage visitors to make environmental behavior changes.

The success of post-visit action resources will clearly be dependent on the willingness of zoo visitors to access and use them. In this regard, several studies have indicated that zoo visitors place more importance on the social and recreational aspects of zoos rather than their educational functions, thus throwing doubt on their motivation to engage with post-visit action resources (Holzer & Scott, 1997; Morgan & Hodgkinson, 1999; Tomas, Crompton, & Scott, 2003; Tribe, 2004). However, research by Smith, Angus, Ballantyne, and Packer (2011) exploring zoo visitors' responses to an on-line video designed to influence their post-visit seafood purchasing behaviors has indicated otherwise. They found that over 2000 attendees at seal shows in a one month recruitment period sent an SMS from their phone wishing to receive more post-visit information about sustainable seafood choices. The extent of visitors' participation in this initiative supports the contention that visitors are willing to receive education materials off-site, and the findings support the premise that such materials can influence visitors' adoption of environmentally sustainable practices.

Similarly, Ballantyne and Packer (2016), in an international study of zoo and aquarium visitors' attitudes toward conservation education, reported that 74% of the 1546 visitors surveyed believed that a zoo or aquarium's role in providing information about conservation and environmental issues was at least as, if not more important than being a place where they could go for a fun experience. The majority of visitors also felt that it was very important for zoos and aquariums to encourage visitors to reflect on and take action in relation to conservation and other environmental issues, and to provide post-visit materials to

encourage people to continue learning about environmental issues after their visit. They indicated their preference for post-visit education materials to be delivered through a website rather than through regular text messages, Facebook groups, online discussion, or regular emails.

The findings of Ballantyne and Packer's (2016) study support the notion that zoo visitors are likely to be receptive to using post-visit action resources. In particular, they suggest that zoos should use websites to present post-visit educational materials aimed at raising visitors' environmental awareness, enhancing environmental learning, reinforcing conservation messages, and encouraging post-visit conservation behavior. The use of post-visit action resource websites presents a significant opportunity for zoos to influence community conservation behavior through encouraging visitors to further process their on-site experience (both cognitively and affectively) and empower them to take informed environmental action in their everyday lives.

Designing an Action Resource Website

According to Lawrence and Tavakol (2007), there are three basic pillars of effective website design—purpose, usability, and aesthetics. The design requirements and intended target audience will determine a website's purpose. Usability refers to ease of navigation, system efficiency, and user satisfaction. Website aesthetics can be described on two dimensions: classical aesthetics (orderliness in design, described by concepts such as clean, pleasant, or symmetrical) and expressive aesthetics (perception of creativity and originality, described by concepts such as sophisticated, creative, or fascinating). The former increases understanding and reduces ambiguity, while the latter increases arousal or user involvement (Lavie & Tractinsky, 2004). Within the context of a learning environment, visual aesthetics have been shown to increase ease and effectiveness of learning as well as enhance information transfer and motivation (Moshagen & Thielsch, 2010). A website intended to encourage a visitor to adopt sustainable behaviors would be most successful if its aesthetics promote usability, resulting in a pleasurable and memorable user experience (O'Brien & Toms, 2010). In this regard, it has been recommended that websites should be kept simple, include visually appealing images, and be regularly updated (Cook & Dupras, 2004; Lee & Gretzel, 2012; Rosen & Purinton, 2004; Tan & Wei, 2006).

In order for post-visit websites to be effective as agents of environmental behavior change, they will need to address those barriers that prevent people from adopting sustainable behaviors (McKenzie-Mohr & Smith, 1999). These include informational barriers (people being unaware of the problem or what they can do in response) and motivational barriers (people being set in their ways or believing their actions will not make a significant difference). Such barriers can be overcome by using prompts to remind people about changing a behavior at the time and place the behavior ought to be performed. Prompts are thus a useful strategy to encourage sustained and effective behavior change (McKenzie-Mohr & Smith, 1999). In addition to reminding people of the desired behavior change, prompts can also persuade them to act on their intentions—in this regard email reminders have been found to be effective in motivating users to engage with a website (Cook & Dupras, 2004).

This paper reports on the development of an action resource website designed to reinforce zoo visitors' on-site conservation learning to support the translation of on-site behavioral intentions into post-visit environmental actions. The website incorporates features that support, extend, and complement the zoo's on-site learning experience, and models appropriate conservation behaviors, thereby encouraging visitors to adopt these in their everyday lives. A prototype website was developed and trialed using an iterative process with three different groups of users: zoo visitors, zoo members, and university students. The

revised website was then tested using an experimental design with 475 zoo visitors across four different sites.

Method

Prototype Website

Four zoos participated in developing and testing the prototype website (Taronga Zoo and Territory Wildlife Park in Australia, Wellington Zoo in New Zealand, and the Bronx Zoo in the USA). Each zoo selected one feature animal and provided background information and video material as well as details about conservation work undertaken by the zoo in relation to the selected species. The website content aimed to build on visitors' on-site zoo experiences and motivate ongoing engagement in conservation learning by highlighting events in the lives of individual animals. Previous research (Hughes, 2011) has demonstrated the effectiveness of this approach in maintaining participants' interest and motivation. The prototype action resource website was designed to appeal to a wide cross-section of visitors, including locals, tourists, children, and young adults.

The website allowed participants to navigate around one zoo's feature animal or explore all four animals' profiles. Photographs and videos were incorporated wherever possible. The website contained the following five components for each of the four animals:

Animal profile. The aim of this component was to provide a specific link to the on-site zoo experience, and to facilitate participants' emotional connection with the featured animal. The individual animal was referred to by name, and details were provided about:

- The featured animal's story—the history of the animal, how and when it came to the zoo
- The featured animal's diet—the type and amount of food given to the animal
- The featured animal's enclosure or environment at the zoo
- The initiatives used to keep the featured animal healthy to enrich the animal's life in the zoo
- Regular updates on the individual animal

Walk on the wild side. The aim of this component was to encourage participants to make a link between the individual zoo animal and its species in the wild, thus motivating a wider concern for species conservation and awareness of the challenges facing the species in the wild. This component included four subsections:

- Unique Features—description of the animal's behavior, appearance, color, scientific classification, and weight
- Life Cycle—the breeding cycle and key developmental stages
- In the Wild—details of foraging habits, threats facing the species, habitat, and population trends
- Human Impacts—positive and negative consequences of human actions linked to the species' survival and well-being

Zoos in action. The aim of this component was to raise awareness of the specific zoo's conservation actions thus modelling appropriate responses, increasing feelings of trust and loyalty towards the zoo, and motivating participants to take their own actions. This section highlighted conservation projects of the zoo that were relevant to the selected animal. These could include projects based at the zoo, within the local community, or in the wild.

Discussion forum. The aim of this component was to actively engage participants in the learning process and provide an opportunity for sharing and reinforcement of appropriate behaviors. It offered a space for participants to ask questions and/or respond to others' comments. Zoo staff were available to answer questions that were specific to the individual animals or zoo procedures.

What can I do to help? The aim of this component was to suggest specific, achievable actions that participants could take to contribute to conservation and protection of the featured species. Clear rationales were provided regarding how such behaviors help wildlife and the environment. This section offered the opportunity for participants to make a commitment to adopt specific pro-environmental actions. These actions were selected separately for each of the four animals, based on three criteria: (a) easily achievable in everyday life, (b) clearly linked with the welfare of the specific zoo animal, and (c) able to be reliably reported by participants. To illustrate, the final target visitor behaviors presented for Ozzie the Osprey (from the Territory Wildlife Park) were:

- Pick up at least one piece of litter each day
- Avoid pouring paint/chemicals/oils down drains
- Increase recycling of aluminum cans and plastics
- Increase use of re-usable shopping bags instead of plastic bags

These behaviors all help to keep waterways free of pollution and thus make marine habitats safer for wild osprey. The other three animals each had a different set of target behaviors.

Although various aspects of the website were refined from one iteration of development to the next, the underlying structure which focused on the above components remained throughout all stages of the process.

Participants and Procedure (Formative Trials)

Formative evaluation of the action resource website was conducted with three groups of participants: visitors to the four participating zoos (trial 1), members of the four participating zoos (trial 2), and university students (trial 3). These three separate trials, conducted over a nine-month period, aimed to identify the most effective content, activities, and methods for engaging actual and potential visitors with the materials. Including a wide range of participants, both visitors and non-visitors, allowed various aspects of the website to be thoroughly tested by groups with different interests, zoo visitation experiences, and levels of technological literacy. At the end of each trial, improvements were made to the website in response to feedback from participants. Summative evaluation of the final version of the website was conducted with zoo visitors using an experimental design.

Zoo visitors (formative trial 1). Zoo visitors were approached during their visit to one of the four zoos and were invited to participate in the research. Participants were asked to provide their email address and to complete a brief on-site survey designed to provide baseline information about their engagement in a range of environmentally sustainable behaviors. Only adult visitors (aged over 18) were approached. A total of 458 visitors were recruited but there were 52 undeliverable email addresses, leaving a potential sample of 406. Of these, approximately 40% were aged 18-30, 36% were aged 30-50, and 24% were over 50. Within a fortnight of their visit, participants were sent an email invitation and login information for the action resource website. At fortnightly intervals, for the following three fortnights, they received a reminder email to return to the site and engage with another component of the resources. Reminder emails also notified participants of new website material, upcoming events, and the status of individual zoo animals. According to online counters, a total of 70 participants (17.2% of those recruited) accessed the website during this

period. Approximately 10 weeks after their visit, participants were asked to complete a follow-up web-based survey in which they provided qualitative and quantitative evaluations of each element of the action resource materials. Only 36 participants (8.9% of the initial sample) completed the entire process, including accessing the website and completing the follow-up web survey.

Zoo members (formative trial 2). In the second trial, the four zoos each sent an email to a random sample of their visitor member database inviting them to participate in the research. Members were requested to visit the action resource website fortnightly over a two-month period and provide feedback via a web-based survey. A total of 8200 members were emailed. According to online counters, 64 members (0.8% of those emailed) accessed the website during the two-month period. Of these, 25 participants (0.3% of those emailed) completed the follow-up web-based survey.

University students (formative trial 3). In the third trial, students in an undergraduate Sustainable Tourism course at the University of Queensland were invited to participate in the research during one of their tutorial sessions. After a brief explanation of the project, students were asked to explore the website for 30 minutes and then complete the follow-up web-based survey to offer their feedback and comments. The students' online behavior was tracked using Google Analytics in order to determine the components of the website that were most likely to attract their attention. A total of 168 students (84% of those enrolled in the course) completed the process by accessing the website and responding to the web survey. Almost all of the students were aged 18 to 29 years.

Follow-Up Web-Based Survey (Formative Trials). As part of each of the three formative trials, participants completed a follow-up web-based questionnaire that asked:

- How they rated the website on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*) on the following criteria:
    - The website was easy to navigate
    - The website was visually attractive
    - The information on the website was engaging
- Which parts of the website contributed to different aspects of education and conservation (checklist question)
- Whether they made a commitment to help one of the animals (yes/no question)
- What aspects of the website encouraged this, and why (open-ended question)
- What they thought were the best or most memorable aspects of the website, and the worst or least engaging aspects of the website, and were there any suggestions for improvement (open-ended questions)

Participants' responses to these questions were analyzed following each trial in order to inform revisions before the next round of testing. However, results across the three trial groups have been combined in this paper for ease of presentation. Quantitative responses were analyzed using descriptive statistics and open-ended responses were content-analyzed.

Changes to the Website throughout the Formative Evaluation Procedure. During the first trial, a registration and password system was used to protect the site, and to enable records of commitments to be kept and displayed as reminders to individual participants. It was found, however, that these procedures unnecessarily complicated the process of accessing the website, and also slowed down the speed of operation. The user registration page was thus removed prior to the second trial. After the first trial, some of the components were revised or re-positioned to improve their visual appeal, a Facebook link was included,

and the opportunity to make a commitment to action was separated from "What can I do to help?" The commitment section was titled "Take Action Now." The number of suggested actions on the new "Take Action Now" page was reduced from 12-25 for each animal to 4 for each animal to make it easier for participants to choose a response. After the second trial, the Discussion Forum was removed as it was rarely accessed by participants. Similarly, the Facebook page was rarely visited by participants despite being updated regularly. The "What can I do to help?" and "Take Action Now" components were re-positioned to attract attention. Additional video material was added in response to participants' feedback. Following the third trial, the website was moved to another hosting site and additional programming was implemented to enable faster access for international users. As a result of these changes, tracking of page visits was discontinued.

Participants and Procedure (Summative Evaluation)

Zoo visitors (summative evaluation). Zoo visitors were approached during their visit to one of the four zoos and were invited to participate in the research. Participants were asked to provide their email address and were told they would receive an email within the next few days with more information on the tasks involved (two web surveys—one straight away and one after eight weeks—and some other tasks that they could do at home on their computer in their own time). Participants who completed all assigned tasks were entered into a draw for a US $1500 travel voucher. A total of 1695 visitors were recruited across the four zoos but there were 82 undeliverable email addresses, leaving a potential sample of 1613. Participants were randomly divided into a treatment and control group by a research assistant who had not participated in the recruitment. This was done by assigning participants to alternating groups in the order of recruitment, thus balancing the day and time of visitation across the two groups. Treatment group participants were instructed to (a) complete a brief online survey collecting baseline information about their interest in environmental issues, their past engagement in a range of environmental behaviors, and their behavioral intentions as a result of their zoo visit; (b) access the Zoo Action website (the link was provided after Questionnaire 1 had been completed); (c) return to the Zoo Action website after receiving an email prompt each fortnight for the next six weeks; and (d) complete Questionnaire 2 ,which was sent eight weeks after completion of the first questionnaire. Control group participants were given instructions (a) and (d) only.

All participants were sent Questionnaire 1 (which was identical for the two groups) within a fortnight after recruitment. A total of 835 participants (just over 50% of those with valid email addresses) responded to Questionnaire 1 (418 in the treatment group and 417 in the control group). A total of 490 participants responded to Questionnaire 2--235 in the treatment group (56% of those who responded to the first questionnaire) and 255 in the control group (61% of those who responded to the first questionnaire). There was no significant difference between the two groups in the percentage of respondents who went on to complete Questionnaire 2, χ^2 [1, N = 835] = 2.093, p = .148. On Questionnaire 2, Treatment group respondents were asked to report the number of times they had accessed the website. Almost all (98%) of the treatment group participants claimed to have accessed the website at least once, with the majority (60%) reporting they had accessed it at least 3 times. Treatment group participants who reported they had not accessed the website were eliminated from further analysis, leaving a treatment group sample of 220. In the final sample, there were no significant differences between the treatment and control groups in age or gender. Overall, 28% were aged 18-30; 49% were aged 30-50; and 23% were over 50; 74%were female. Most participants reported having explored 2 or more animals on the website, with

23% exploring only the animal that was relevant to the zoo they visited, 22% exploring only animals from other zoos, and 55% exploring both their own and at least one other animal.

Follow-up web-based survey (Questionnaire 2, summative evaluation). All participants (in both the Treatment and Control groups) were asked:

- Which of a list of 18 common environmental actions they had already taken as a result of their zoo visit (and/or the zoo action website), including increased recycling, composting, responsible purchasing, picking up litter, talking to others, and reducing water, energy, and fuel consumption. Response options included:
  - I have already done this
  - I was already doing the maximum possible
  - I haven't done this but I intend to
  - This is something I am unlikely to do
- For those items where they reported "I have already done this," they were asked to rate the extent to which they had increased that action since their zoo visit on a scale from 1 (*just a little)* to 7 (*a great deal*).

It was hypothesized that at the time of the follow-up survey, treatment group participants would have already taken a larger number of actions than control group participants, and that they would have increased these actions to a larger extent than control group participants.

Treatment group participants were also asked:

- How many times they had accessed the website
- Which animals they had explored on the website
- Whether they had made any commitments to "Take Action" on the website

Results

Formative Evaluation

Participants' ratings of the website. Participants' ratings of the website on the three criteria of ease of navigation, visual appeal and engaging content indicated that all three samples agreed that the website had met the three criteria (mean ratings ranged from 4.00-5.34 on the 6-point disagree-agree scale).

Parts of the website that contributed to different aspects of visitor conservation education. A matrix checklist was used so that participants could indicate which parts of the website had:

- Helped them learn things they didn't know before
- Helped them feel more connected to the individual animal
- Helped them feel more concerned about animals in the wild
- Encouraged them to become more interested in the conservation work of the zoo
- Encouraged them to want to return to the zoo
- Encouraged them to do more to help species conservation

Although all of the components were somewhat successful in meeting their specific aims (see Table 1), the two components that participants found most helpful were Animal Profile and What can I do to help? Animal Profile was particularly successful in helping participants feel more connected to the individual animal.

Table 1
Percentage of participants who found each component of the website helpful, according to six functions

Website functions	Animal Profile N=203	Walk on Wild Side N=203	Zoos in Action N=203	What can I do to help? N=203	Take Action Now N=169[a]
Helped you learn things you didn't know before	57%	37%	33%	40%	24%
Helped you feel more connected to the individual animal	65%	18%	22%	13%	14%
Helped you feel more concerned about animals in the wild	35%	36%	25%	37%	36%
Encouraged you to become more interested in the conservation work of the zoo	27%	14%	32%	32%	29%
Encouraged you to want to go to the zoo	46%	26%	35%	9%	16%
Encouraged you to do more to help species conservation	30%	19%	25%	47%	43%

[a]In trial 1, the Take Action Now component was included in What can I do to help? Results reported above in the Take Action Now column are derived from trials 2 and 3 only.

Participants' commitments and aspects of the website that encouraged this. A key component of the website was encouraging users to make a commitment to adopt specific pro-environmental actions. Participants were asked which aspects of the website had encouraged them to make commitments, and why. A total of 149 participants across all three trials provided responses. The most frequently mentioned components were "What can I do to help?" (mentioned by 32% of respondents) and "Animal Profile" (mentioned by 24% of respondents). These data are consistent with, and shed further light on, the findings reported in Table 1. Participants' open-ended responses to this question were content-analyzed and found to fall into six main categories. These are summarized below, in order of frequency of occurrence, with illustrative comments from participants.

Providing information about actions. All three participant groups commented that the provision of information about simple actions that they could take to help the featured species was a key factor in their commitment. (These were mostly in the "What can I do to help?" and "Take Action Now" sections of the website.) They particularly liked the fact that the actions were easy and achievable in everyday life, and that an explanation was given for why they were important. Having actions that were linked to the welfare of the featured animal also appeared to be important for some respondents. Others were motivated to protect the environment, but confessed that the information regarding simple things they could do was new to them.

> It was interesting to see what else we could do to help with conservation besides what we were doing already. (Zoo visitor)

> The tips on how you could carry them out, it made it easy to think "I want to do this and now I have ideas how." I particularly liked how there were generally multiple suggestions so even if some of them weren't suitable for your home/family/lifestyle there were others that were. (Zoo member)

The how can I help section, because there were suggestions like switch tuna brands which are actually really simple, however, I never really realized I should do it. (University student)

Facilitating an emotional connection with animals. All three participant groups indicated that the website had forged an emotional connection with the featured animals, and that this in turn had influenced them to make a commitment to take action. Personal details of each animal's story, along with photographs and videos, created a bond between participants and the featured animal. (These were mostly in the "Animal Profile" section of the website.)

I thought it would be worth it for the animals to show I care. (Zoo visitor)

The animal profiles encouraged a personal connection. (Zoo member)

The "Tuti's Story" section made me feel really connected to the gorilla and feel sorry for any potential damage I am doing to her species. (University student)

Explaining the negative impacts of human actions. For some participants, making connections between human actions and the struggles faced by individual animals and entire species created a sense of responsibility. In particular, choosing feature animals whose story highlighted some form of human impact was found to be a powerful strategy for motivating participants to want to change their behavior. (These stories were mostly in the "Animal Profile" and "Walk on the Wild Side" sections of the website.)

The plight of the animals in most danger. (Zoo member)

I think knowing about the animal and the struggles they go through because of our irrational and irresponsible behaviors does make me want to do something so that these Sea Lions don't suffer any further. (University student)

Providing information about animals. Some participants indicated that information about the animals had facilitated their desire to take action. (This was mostly in the "Animal Profile" and "Walk on the Wild Side" sections of the website.) Although a larger number of participants were motivated by an emotional connection than by information alone, it is likely that a website that contains both cognitive and emotional appeals will be the most successful in motivating participants to take action.

The animals need our help. (Zoo visitor)

The information about the animals makes me understand we need to do something to help with the animals as they have already become endangered because of human activities and impacts. (University student)

Encouragement to make a commitment. Being specifically asked to tick a box to make a commitment to take action was noted as helpful by some participants.

Specific prompts to make a pledge. (Zoo member)

The use of the ticking the boxes made you actually think about it and that when I clicked them I was committing virtually but I know I'll do them in real life. (University student)

Hearing about zoo conservation actions. A small number of participants mentioned that the zoo's conservation actions had not only motivated them to do something for the animals, but also made them more supportive of zoos. (This was in the "Zoos in Action" section of the website.)

> Reading what the zoos are doing to help and what I can do, I feel as though I can contribute. (University student)

> The part where I could see what zoos did to the Penguins to help them makes me want to help the Penguins to bring them back to their colony. (University student)

Most and least engaging aspects of the website. Responses were provided by 191 participants across the three trials and are summarized in Table 2. The aspects participants considered the best or most engaging were the stories and profiles of featured animals, the general provision of information, and the animal photographs and videos. Given the appeal to participants of the stories about individual animals, it is important to link information about human impacts and suggested actions to these featured animals wherever possible. The aspect participants considered the worst or least engaging related mainly to procedural aspects (e.g., the speed of the website, difficulties accessing the website, registration procedures). Most of these issues had been resolved by the third trial. The main concern regarding content was that there was too much information and not enough videos. Design/layout issues included navigational issues, comments about font sizes, colors, and the user interface. Some participants felt the focus on four feature animals was too limiting, or that the website could have gone further in challenging or motivating them to take action.

Table 2
The best and worst aspects of the website, according to participants (percentage of those who responded to this question who referred to each category)

Website aspects	Zoo visitors	Zoo members	Students	Average of three groups
Best aspects				
Stories about feature animals	36	35	23	31.3
Information	18	14	39	23.7
Photographs	36	14	11	20.3
Videos	0	14	11	12.5
Zoo connections	0	29	4	11.0
Suggested actions	0	7	14	7.0
Design of website	0	0	11	3.7
Human impacts	9	0	2	3.7
Worst aspects				
Procedural aspects re access	67	43	10	40.0
Too much information	16	7	27	16.7
Design/layout	0	29	11	13.3
Other content-related issues	16	14	5	11.7
Scope too narrow	0	14	7	7.0
Not challenging enough	0	7	13	6.7

Suggestions for improvement mainly focused on addressing the shortcomings identified above and included:

- Use more infographics, games, interactives, cartoons, photographs, and catchy phrases
- Add a video gallery
- Add new animals every few months
- Feature an animal who has been rescued by the zoo
- Provide more information about, and videos of, the animal's daily life
- Celebrate the featured animal's birthday
- Set up a Facebook page for each featured animal
- Create a live stream (video feed) of the animals
- Clearly explain the links between suggested actions and animals in the wild
- Create some conservation events or volunteer activities that participants can join at the zoo
- Include general environmentally responsible actions as well as those linked to featured animals
- List brands and products to be avoided, positive alternatives, and where to get them
- Provide statistics and photographs showing the extent of environmental problems and impacts on animals
- Share personal stories of people who have taken action
- Introduce a points system or reward program for people who share stories
- Provide an option to subscribe for regular updates

Online behavior of students as they engaged with the website. Google Analytics was able to track the components of the website that students visited as they freely explored during the allocated 30-minute period. The results are presented in Table 3, separately for each of the four featured animals. Clearly, Miya the Sea Lion and Bandit the Little Blue Penguin were the most popular animals. This did not reflect their placement on the home page, which would actually have favored Ozzie the Osprey (on the top left, see Figure 1). Within each animal's site, the animal's own story was the most popular, followed by "What can I do to help?", confirming students' web survey responses about the aspects they liked best, and the aspects that had the greatest impact on their desire to take action. In particular, the value of the featured animal's own personal story was clearly evident.

Summative Evaluation

There were no differences between the treatment and control groups in their responses to Questionnaire 1 scales measuring interest in environmental issues ($t_{832} = 0.754$, $p = .451$), past environmental behavior ($t_{826} = 0.243$, $p = .808$), or behavioral intentions as a result of their zoo visit ($t_{802} = 0.302$, $p = .763$). This was expected as the sample had been randomly divided into the two groups.

On Questionnaire 2, a larger proportion of the Treatment group than the Control group claimed they had increased the frequency of at least one of the 18 behaviors as a result of their zoo visit (91.8% of the treatment group; 83.1% of the control group; χ^2 [1, N = 475] = 7.952, one-tailed $p = .002$). The difference between the groups was more pronounced when comparing the proportions who claimed to have changed at least 4 of the 18 behaviors (80.1% of the treatment group compared with 67.4% of the Control group, χ^2 [1, N = 475] = 9.495, one-tailed $p = .001$). Treatment group participants claimed to have increased the frequency of an average of 7.255 behaviors and control group participants an average of 6.153 behaviors, $t_{473} = 2.672$, one-tailed $p = .004$ (see Table 4). The behaviors most likely to

change were "reused boxes, bags etc" (53% of Treatment group and 46% of Control group), "picked up other people's litter" (49% of Treatment group and 47% of Control group), "done more to conserve energy at home or work" (51% of Treatment group and 41% of Control group), and "encouraged others to recycle" (50% of Treatment group and 40% of Control group).

Mean ratings of the extent to which participants had changed each of the 18 behaviors ranged from 3.30 to 4.25 (on a 1-7 scale) for the Treatment group and 3.25 to 4.26 for the Control group, but these ratings were only completed when the participant selected the "I have already done this" response. The measure of the extent to which participants had increased those behaviors they reported as having changed (1-7 scale) was thus recoded, entering 0 when the behavior had not been reported as having changed (resulting in a 0-7 scale). This enabled an overall Behavior Change Index to be calculated by taking an average across the 18 behaviors. The Treatment groups scored significantly higher on this index (M = 1.513) than the Control group (M = 1.218), $t_{408} = 2.345$, one-tailed $p = .010$. There was a significant positive correlation between the number of times Treatment group participants had accessed the website and the extent of change as measured by the Behavior Change Index ($r_{192} = .292$, $p < .001$). In particular, those who accessed the website fewer than 3 times were no different from the Control group in the extent of their reported behavior change (see Table 5). Thus, emailing reminders to regularly return to the website are clearly important.

Table 3
Percentage of students who visited each part of the website, with components listed in decreasing order of attracting power

Website components	**Featured Animals**				
	Miya the Sea Lion	**Bandit the Little Blue Penguin**	**Tuti the Gorilla**	**Ozzie the Osprey**	**Average across four animals**
Animal's Story (part of Animal Profile)	36	33	24	11	26
What can I do to help?	29	27	18	5	20
Home Sweet Home (part of Animal Profile)	29	23	15	4	18
Animal's Diet (part of Animal Profile)	27	20	16	4	17
Take Action Now (Commitment Page)	27	20	15	8	17
Keeping Healthy and Happy (part of Animal Profile)	29	22	14	5	17
Human Impacts (part of Walk on the Wild Side)	24	20	18	6	17
Unique Features (part of Walk on the Wild Side)	27	18	11	3	15
Life Cycle (part of Walk on the Wild Side)	24	18	13	4	15
In the Wild (part of Walk on the Wild Side)	21	15	10	4	13
Zoos in Action	16	16	12	0	11

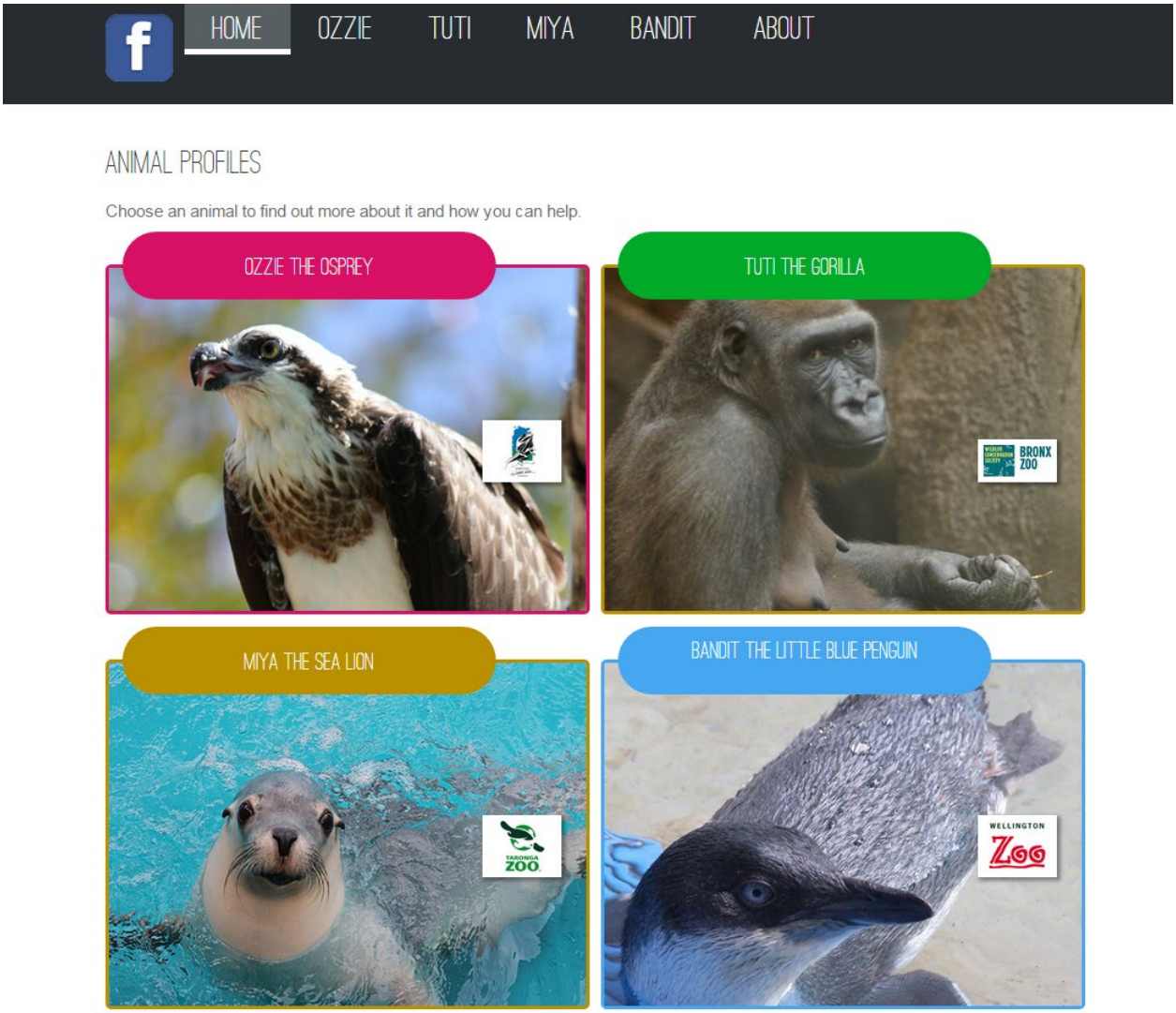

Figure 1. The website home page.

Table 4
Mean number of behaviors falling in each response option: Treatment vs Control groups

Condition	Response options				Total
	I have already done this	I was already doing the maximum possible	I haven't done this but I intend to	This is something I am unlikely to do	
Treatment	7.255	4.846	3.900	2.000	18
Control	6.153	5.588	3.977	2.282	18

Table 5
Mean Behavior Change Index according to frequency of accessing the Zoo Action websites

No of times accessed the website	N	Mean Behavior Change Index	% who made a commitment to take action
Control group			
0	217	1.218	NA
Treatment group			
1-2	73	1.131	4%
3-4	105	1.619	22%
5 or more	26	2.199	27%

Only 16% of the Treatment group reported that they had made a commitment on the "Take Action Now" page. Those who made a commitment changed significantly more behaviors (M = 8.303) than those who did not make a commitment (M = 6.795), $t_{202} = 1.844$, one-tailed $p = .033$) and received a significantly higher Behavior Change Index score (M = 2.109, compared with M = 1.400), $t_{190} = 2.760$, one-tailed $p = .003$. Almost all of those who had made commitments (91%) had accessed the website 3 or more times. In fact, those who had accessed the website 3 or more times were 5-6 times more likely to make a commitment than those who accessed it one or two times, χ^2 [2, N = 204] = 12.594, one-tailed $p = .001$, (see Table 5).

Discussion

Attractions such as zoos and aquariums are perfectly placed to raise visitors' awareness of species extinction, conservation projects, animal behavior, and habitat destruction thereby influencing their uptake of actions supporting animal conservation. However, a visit to such an attraction is often not enough in itself—findings from other studies indicate that visitors need time after their visit to process and understand the multiple aspects of their experience (Ballantyne, Packer, & Sutherland, 2011); they need systematic prompts and questions to help them effectively reflect upon what they have seen and learned (Hughes et al., 2011); and they need specific suggestions and scenarios to enable them to plan the changes they would like to implement in their homes and work. As Ham (2007, p. 43) argues:

> We must realize that the window of communication opportunity is much too brief in many interpretive encounters (usually less than an hour and sometimes only a few seconds) to realistically expect strong and enduring attitude impacts.

The research reported here was premised on the above findings and on the assumption that post-visit action resources can reinforce, enhance, and extend the impact of zoo visits, thereby helping visitors make real and lasting changes to their everyday environmental practices (Ballantyne & Packer, 2011; Hughes et al., 2011). Responses from users of the action resource website are encouraging and supportive of these premises.

The key factor in promoting learning and feelings of connection with wildlife and environmental issues was the Animal Profile section. This component includes the featured animal's life story, anecdotes about the animal's dietary preferences and living conditions, and zoo keepers' accounts of how the animal is cared for in captivity. Stories act as powerful connectors that draw visitors into the animal's world, create analogies and foster empathy (Ham, 2013; Redford, Groves, Medellin, & Robinson, 2012). Positive responses to this story-based section are thus not surprising, as humans have been using stories to organize and make sense of their surroundings for centuries (Herman, 2013).

In the website context, the additional appeal of animal stories is likely to be connected to feelings of familiarity. Even though the details of the animal's dietary preferences and sleeping habits might be new, all visitors are familiar with the concepts of a daily routine, diet, and home. Ham (2013) refers to these as universal concepts because they help visitors emotionally and cognitively connect with the object/s being interpreted. Further, Meyers, Saunders, and Birjulin (2004) report an association between visitors' emotional reactions to animals and their willingness to undertake action to save animals. The current study supports these viewpoints, as respondents describe feeling an emotional rapport with the featured animals and concern about the plight of others in the wild.

The appeal of website stories was also evident in other aspects explored by this research—animal stories were voted as the best feature of the website, the section that the student group explored in most detail, and the aspect that needed expanding (e.g., comments such as provide more about daily routines, celebrate animals' birthdays, set up a Facebook page for each animal). If post-visit action resources are to become an integral part of the zoo's educational programs, regular updates in story format will be required. These could focus on life events of zoo animals (pregnancies, births, liaisons, deaths), stories from and about zoo keepers, and anecdotes from other visitors about their zoo visit and environmental issues in their local area.

Although animal anecdotes facilitated an emotional connection with the animal, it was the section titled "What can I do to help?" that was the most successful in prompting users to make commitments to take environmental action. Respondents stated that they were motivated to take action because the strategies modeled were specific, easy to undertake, and achievable. This suggests that zoos and other wildlife attractions need to move from simply raising awareness to providing detailed strategies for action both on- and off-site. Most visitors are already aware of key environmental issues facing our planet; what they need now is specific advice and reminders on how to convert their concerns into concrete and effective actions. Wildlife attractions such as zoos are well-placed to provide such information.

This research also indicates that it is important to give visitors a range of actions to choose from, as not everyone will encounter the same environmental issues or have opportunities to adopt the same environmental practices. Providing a range of options not only allows visitors to choose the ones that most closely align with their home and work environments, it also gives them a sense of control over their actions, a factor that has been associated with engagement and mindfulness in other visitor settings such as museums (Moscardo, 1999). However, it should be noted that too much choice can be debilitating (Schwarz, 2004)—in the present study four behavioral options per animal appeared to be a good solution.

By encouraging visitors to select from a variety of actions, the website suggests that everyone can make a difference, regardless of their surroundings, and places the onus for change firmly on the visitor. To further enhance universal appeal and relevance, it is suggested that resources should incorporate a combination of easy and more challenging activities. This allows those who are already doing the basics to enhance and increase their level of commitment, and those who are novices to start with introductory activities. This is important, as one of the barriers preventing personal involvement is that actions are perceived to be too difficult (McKenzie-Mohr & Smith, 1999). Incremental steps using small, easy behaviors are likely to be more appealing; once these are mastered, visitors can be encouraged to extend their commitment to the next level. This would also address the perceptions of some respondents in this study that the suggested activities were not challenging enough.

The suggestions given for future website design imply that opportunities to publicly recognize and celebrate respondents' involvement in environmental activities are likely to be

effective in prompting action. For example, respondents mentioned being motivated and empowered by ticking boxes that indicated that they were going to adopt particular conservation practices, and those who made such a commitment reported greater changes to their actual behavior than those who did not. Respondents also expressed interest in assisting with worthwhile projects run by the zoo. Accordingly, it is suggested that zoos develop website Communities of Practice where like-minded citizens could share their experiences, stories, and insights. Discussion forums and social media sites could also be used to create a community who may be physically separated but united in their conservation goals, although it should be noted that these were not found to be particularly successful in the current study.

Regardless of the animals featured on the website, wildlife organizations need to ensure that post-visit action resources clearly support and reinforce on-site events and messages (Ballantyne & Packer, 2011; Hughes, 2011). Responses from the present research indicate that as a bare minimum, online post-visit action resources should aim to provide the following:

- Regular updates on conservation activities and events in the zoo
- Stories and lifecycle details about specific zoo animals and their keepers
- Stories about the plight of animals in the wild (e.g., current global events, issues, and campaigns)
- Zoo-based environmental projects and donation opportunities
- Specific strategies for introducing conservation into home and work environments
- Forums for sharing ideas, experiences, and resources
- Visually appealing content

The summative evaluation of the effectiveness of the post-visit action resource website in increasing visitors' adoption of environmentally sustainable behaviors has demonstrated small but measurable effects. Importantly, the evaluation has identified the need to encourage visitors to return to the website multiple times. Visitors who accessed the website at least three times were five to six times more likely to make a commitment to change their behavior, and rated the extent of their actual behavior change significantly more highly than those who only accessed it once or twice. Thus in implementing post-visit action resource approaches it will be important to encourage people to access the resources multiple times. A system for maintaining contact with visitors and sending them regular but varied reminders is also recommended. Such a system could easily be automated.

Limitations

There were four key limitations in the present study. First, despite numerous reminders, the number of people accessing the website and responding to the surveys was lower than expected. This might be due to the nature of the task—people generally use zoo websites in the pre-visit phase of their trip to plan their itinerary. It is rare to access a site's website after the visit unless one is planning a return visit. Until post-visit use of resources becomes common-place, this is likely to remain a challenge. Second, the zoos participating in this study already had comprehensive websites—participants may not have felt sufficiently motivated to visit a second site. Third, as mentioned, the registration and password system used to protect the site in trial 1 of the study proved onerous and, consequently, discouraged access. This supports Zhang and von Dran's (2000) claim that insufficient attention to hygiene factors (hyperlinks, access issues) have the potential to create dissatisfaction. Addressing these issues did improve participation in the second and third trials, suggesting that ease of access is critical if zoos want to use websites to attract and engage visitors. Finally, follow-up measures of behavior change are reliant on self-report, which may be subject to inflation due to acquiescence or social desirability. Although the use of a control group should have enabled some of this error to be accounted for, it is still possible that

Treatment group participants felt more obliged to report behavior change than Control group participants.

Conclusion

In conclusion, this research represents a re-conceptualization of the role of zoos and other similar attractions in offering not only on-site enjoyment, satisfaction, and immediate benefits to their visitors, but also post-visit action resources that provide transformative experiences to support visitors' on-site environmental learning. The study pioneers a new direction of research designed to gain knowledge and understanding of visitors' post-visit rather than on-site conservation learning experiences—a major change in the focus of visitor research presently being undertaken in this field. The provision of post-visit action resources is essential if organizations wish to seriously impact their visitors' conservation learning, understanding, reflection, and thus long-term adoption of environmentally sustainable behavior. Accordingly, it is hoped that the findings of this research will encourage and enable wildlife tourist attractions, such as zoos, to take a more proactive approach to visitor conservation education—using the on-site experience to motivate people to connect with post-visit learning materials once they leave the site. If acted upon, these research findings will enable wildlife attractions to meet their missional aims by helping visitors to increase their conservation awareness and translate their behavioral intentions into post-visit environmental action.

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